

Claims

What is claimed is:

1. A solid titanium catalyst for homo-polymerization and co-polymerization of ethylene,
5 wherein said catalyst is produced by:

(i) preparing a magnesium compound solution by contacting a halogenated magnesium compound with alcohol;

10 (ii) reacting said solution with an ester compound having at least one hydroxy group and a boron compound having an alkoxy group; and

(iii) reacting the solution from above (ii) with a mixture of a titanium compound and a silicon compound to produce solid catalyst, and optionally the solid catalyst are further
15 reacted with a titanium compound.

2. A solid titanium catalyst according to Claim 1, wherein said ester compound having at least one hydroxy group is an unsaturated aliphatic ester having at least one hydroxy group, which is selected from the group consisting of 2-hydroxy ethylacrylate, 2-hydroxy ethylmethacrylate, 2-hydroxy propyl acrylate, 2-hydroxy propylmethacrylate, 4-hydroxy butylacrylate, pentaerithritol triacrylate; an aliphatic monoester or polyester having at least one hydroxy group, which is selected from the group consisting of 2-hydroxy ethyl acetate, methyl 3-hydroxy butylate, ethyl 3-hydroxy butylate, methyl 2-hydroxy isobutylate, ethyl 2-hydroxy isobutylate, methyl 3-hydroxy-2-methyl propionate, 2,2-dimethyl-3-hydroxy propionate, ethyl-6-hydroxy hexanoate, t-butyl-2-hydroxy isobutylate, diethyl-3-hydroxy glutarate, ethyllactate, isopropyl lactate, butyl-isobutyl lactate, isobutyl lactate, ethyl mandelate, dimethyl ethyl tartrate, ethyl tartrate, dibutyl tartrate, diethyl citrate, triethyl citrate, ethyl-2-hydroxy-caproate, diethyl bis-(hydroxymethyl malonate; an aromatic ester having at least one hydroxy group, which is selected from the group consisting of 2-hydroxy ethyl benzoate, 2-hydroxy ethyl salicylate, methyl-4-(hydroxy methyl) benzoate, methyl-4-hydroxy benzoate, ethyl-3-hydroxy benzoate, 4-methyl salicylate, ethyl salicylate, phenyl salicylate, propyl-4-hydroxy benzoate, phenyl-3-hydroxy naphthanoate, monoethylene glycol monobenzoate, diethylene glycol benzoate, triethylene glycol monobenzoate; an alicyclic ester having at least one hydroxy group as in hydroxy butyl-lactone; and wherein said boron compound having an alkoxy group is represented by the general formula $BR^1_n(OR^2)_{3-n}$,
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where R^1 represents a hydrocarbon having 1 ~ 20 carbons or a halogen atom, R^2 for a hydrocarbon having 1 ~ 20 carbons, and n for an integer of 0 ~ 2, said boron compound being selected from the group consisting of trimethyl borate, triethyl borate, tributyl borate, triphenyl borate, methylboron diethoxide, ethylboron diethoxide, ethylboron dibutoxide, butylboron dibutoxide, phenylboron diphenoxide, diethylboron ethoxide, dibutylboron ethoxide, diphenylboron phenoxide, diethoxyboron chloride, diethoxyboron bromide, diphenoxyboron chloride, ethoxyboron dichloride, ethoxyboron dibromide, butoxyboron dichloride, phenoxyboron dichloride, and ethylethoxyboron chloride.

3. A solid titanium catalyst according to Claim 1, wherein said titanium compound is represented by the general formula of $Ti(OR)_aX_{4-a}$, where R stands for an alkyl group with 1 ~ 20 carbons, X for a halogen atom, and " a " for an integer of 0 to 4; and wherein said silicon is represented by the general formula of R_nSiCl_{4-n} , where R stands for hydrogen, or an alkyl, alkoxy, haloalkyl, or aryl group having 1 to 10 carbons; a halosilyl or halosilyl alkyl group having 1 to 8 carbons; n = an integer of 0 to 4.

4. A solid titanium catalyst according to Claim 3, wherein said titanium compound is a 4-halogenated titanium, which is selected from the group consisting of $TiCl_4$, $TiBr_4$, and TiI_4 ; a 3-halogenated alkoxy titanium, which is selected from the group consisting of $Ti(OCH_3)Cl_3$, $Ti(OC_2H_5)Cl_3$, $Ti(OC_2H_5)Br_3$, and $Ti(O(i-C_4H_9))Br_3$; a 2-halogenated alkoxy titanium, which is selected from the group consisting of $Ti(OCH_3)_2Cl_2$, $Ti(OC_2H_5)_2Cl_2$, $Ti(O(i-C_4H_9))_2Cl_2$, and $Ti(OC_2H_5)_2Br_2$; and a tetraalkoxy titanium, which is selected from the group consisting of $Ti(OCH_3)_4$, $Ti(OC_2H_5)_4$, and $Ti(OC_4H_9)_4$; and wherein said silicon compound is a silicon tetrachloride; a trichlorosilane such as methyltrichlorosilane, ethyltrichlorosilane, and phenyl-trichlorosilane; a dichlorosilane such as dimethylchlorosilane, diethyldichlorosilane, diphenyldichlorosilane, and methylphenyldichlorosilane; and a monochlorosilane such as trimethylchlorosilane.

5. The solid titanium catalyst according to Claim 3, wherein said titanium compound comprises titanium tetrachloride, and said silicon compound comprises silicon tetrachloride.

6. The solid titanium catalyst according to Claim 1, wherein the amount of the mixture of a titanium compound and a silicon compound is 0.1 ~ 200 mol per mole of said halogenated magnesium compound, and the molar ratio of said titanium compound to said silicon compound in the mixture is 0.05 ~ 0.95.